

CLAIM SHEET

1. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

2. (Amended) A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and peak portions and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

3. (Cancel)

4. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and peak portions of said pair of diffractive gratings are formed in a chamfered shape.

5. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

6. (cancel)

7. (cancel)

9. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, peak portions of one of said pair of diffractive gratings are formed in a chamfered shape, and valley portions of the other of said pair of diffractive gratings are formed in a chamfered shape.

10. (cancel)

11. A diffractive optical element for diffracting light of a specific order with a high diffraction efficiency, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, wherein said integer is the number of said specific order.

12. A blazed type diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

13. (Amended) An optical system, comprising:

a diffractive optical element according to one of claims 1 to 7 and 9 to 12; and
a lens system.

14. An optical system according to claim 13, wherein each of said at least two wavelengths are within a visible range.

15. An optical system according to claim 13, wherein one of said pair of diffraction gratings is made of resin.

16. An optical system according to claim 13, wherein each of said pair of diffraction gratings are made of resin.

17. An optical system according to claim 13, wherein said optical element corrects chromatic aberration in said lens system.

18. (Amended) An optical system, comprising: a diffractive optical element according to any one of claims 2-7, 9, and 10; and

a lens system,

wherein each of said pair of diffractive gratings comprises a flat surface, and a length a of said flat surface in a direction of grating arrangement of each diffractive grating is $0.5 \mu\text{m} < a < 2 \mu\text{m}$.

19. (Amended) An optical system, comprising:

a diffractive optical element according to any one of claims 2-7, 9, and 10; and
a lens system,

wherein each of said pair of diffractive gratings comprises a curved surface, and a radius of curvature r of said curved surface on a cross sectional plane including a direction of grating arrangement of each diffractive grating is $0.5 \mu\text{m} < r < 2 \mu\text{m}$.

20. (Amended) A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein a maximum optical path length difference occurring with respect to at least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

21. A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein said diffractive grating portion is formed on a light transmitting surface of a lens.

22. A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein said diffractive grating portion is formed on a light transmitting surface of a lens, and a maximum optical path length difference occurring with respect to at least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

23. (New) A diffractive optical element, comprising:

a first diffractive grating;

a second diffractive grating; and

a space formed between said first diffractive grating and said second diffractive grating, said space consisting of an air layer having a refractive index of 1,

wherein a maximum optical path length difference occurring in said first and second diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

24. (New) A diffractive optical element, comprising:

a first diffractive grating satisfying $n_d = 1.525$, and $v_d = 47.8$;

a second diffractive grating satisfying $n_d = 1.635$, and $v_d = 23.0$; and

a space formed between said first diffractive grating and said second diffractive grating, said space consisting of an air layer having a refractive index of 1,

wherein a maximum optical path length difference occurring in said first and second diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.